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Short communication

Localized surface plasmon resonance based highly sensitive room temperature pH sensor for detection and quantification of ammonia

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Abstract

Ammonia sensor which works in acidic region was developed using metallic copper nanoparticles. The change in localized surface plasmon resonance profile of copper nanoparticles was studied by varying the pH of the solution from 1 to 12. At low pH ranges, the colloidal system shows the copper quantum dot nature and the SPR peak is obtained at the infra red region. At high pH ranges, the resonance peak is shifted into the visible region which is an important property of a pH based colorimetric sensor. Using this property, we successfully designed and calibrated liquid phase and gaseous phase ammonia sensors at very low concentrations (up to 20 ppm). The sensor shows very good photo stability and thermal stability which depends on the pH of the solution. Using cotton plug, gaseous phase ammonia sensor was constructed and sensitivity was confirmed. At very low pH, the concentration of the ammonia solution is directly proportional to the absorbance and obeys Beer–Lambert's law.